

# *Bell Work*

## *3-Dec-2015*

**a) What is the name of  $\text{Al}(\text{OH})_3$ ?**

**b) What is the law of conservation of mass?**

**c) What are the two sides of a chemical equation called?**

**Objective:** You will be able to identify the three (3) of the five (5) different types of chemical rxns and predict products

# *Turn In*

Nomenclature Practice

Home Work p. 231 #13-22 (not yet... soon)

# *Types of Reactions*

There are five types of chemical reactions we will talk about for now:

1. **Synthesis rxns**
2. **Decomposition rxns**
3. **Single displacement rxns**
4. **Double displacement rxns**
5. **Combustion rxns**

**You need to be able to identify the type of reaction and predict the product(s)**

# *Steps to Writing Reactions*

**Some steps for doing reactions**

- 1. Identify the type of reaction (rxn)**
- 2. Predict the product(s) using the type of rxn as a model**
- 3. Balance it\***

**Don't forget about the diatomic elements!**

# *1. Synthesis Rxns*

**Synthesis reactions** occur when two substances (generally elements) combine and form a compound.

**reactant + reactant  $\rightarrow$  1 product**

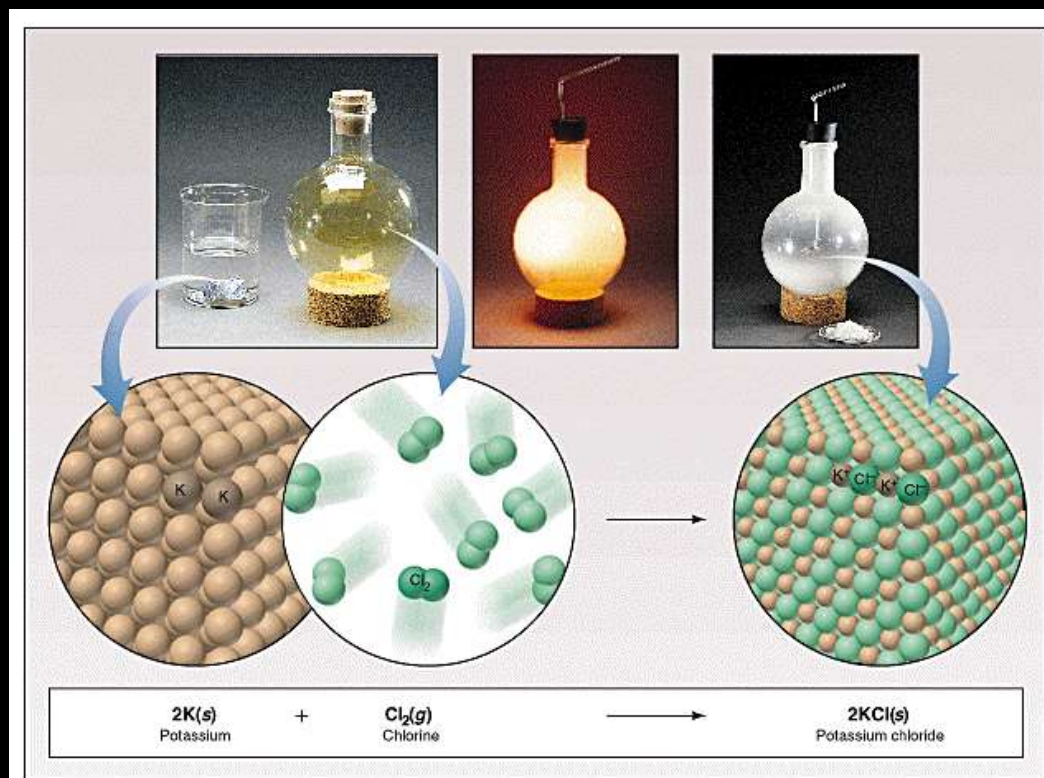
**Basically:  $A + B \rightarrow AB$**

Example:  $2\text{H}_2 + \text{O}_2 \rightarrow 2\text{H}_2\text{O}$

Example:  $\text{C} + \text{O}_2 \rightarrow \text{CO}_2$

# *Synthesis Rxns*

Here is another example of a synthesis reaction



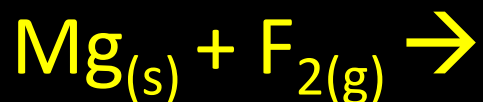
# *Practice*

Predict the products. Write and balance the following synthesis reaction equations.

Sodium metal reacts with chlorine gas



Solid Magnesium reacts with fluorine gas



Aluminum metal reacts with fluorine gas





## *2. Decomposition Rxns*

**Decomposition reactions** occur when a compound breaks up into the elements or in a few to simpler compounds

**1 Reactant  $\rightarrow$  Product + Product**

In general:  **$AB \rightarrow A + B$**

Example:  $2 \text{H}_2\text{O} \rightarrow 2\text{H}_2 + \text{O}_2$

Example:  $2 \text{HgO} \rightarrow 2\text{Hg} + \text{O}_2$

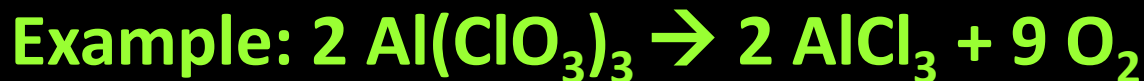
# *Decomposition Exceptions*

Carbonates and chlorates are special case decomposition rxns that do not go to the elements.

Carbonates ( $\text{CO}_3^{2-}$ ) decompose to carbon dioxide and a metal oxide



Chlorates ( $\text{ClO}_3^-$ ) decompose to oxygen gas and a metal chloride



### *3. Single Displacement Rxns*

**Single Replacement Rxs** occur when one element replaces another in a compound.

A metal can replace a metal (+) **OR**  
a nonmetal can replace a nonmetal (-).

**element + compound  $\rightarrow$  product + product**

**$A + BC \rightarrow AC + B$**  (if A is a metal) **OR**

**$A + BC \rightarrow BA + C$**  (if A is a nonmetal)

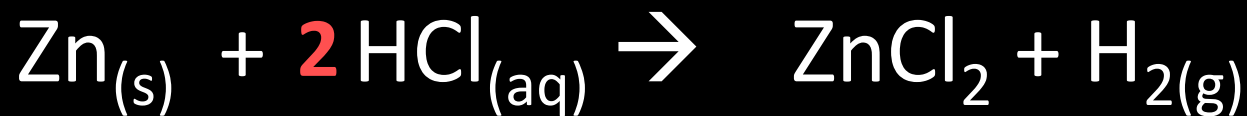
remember the cation always goes first!)

**When  $H_2O$  splits into ions, it splits into  $H^+$  and  $OH^-$  (not  $H^+$  and  $O^{-2}$  !!)**

# *Single Displacement Rxns*

Write and balance the following single replacement rxn equation:

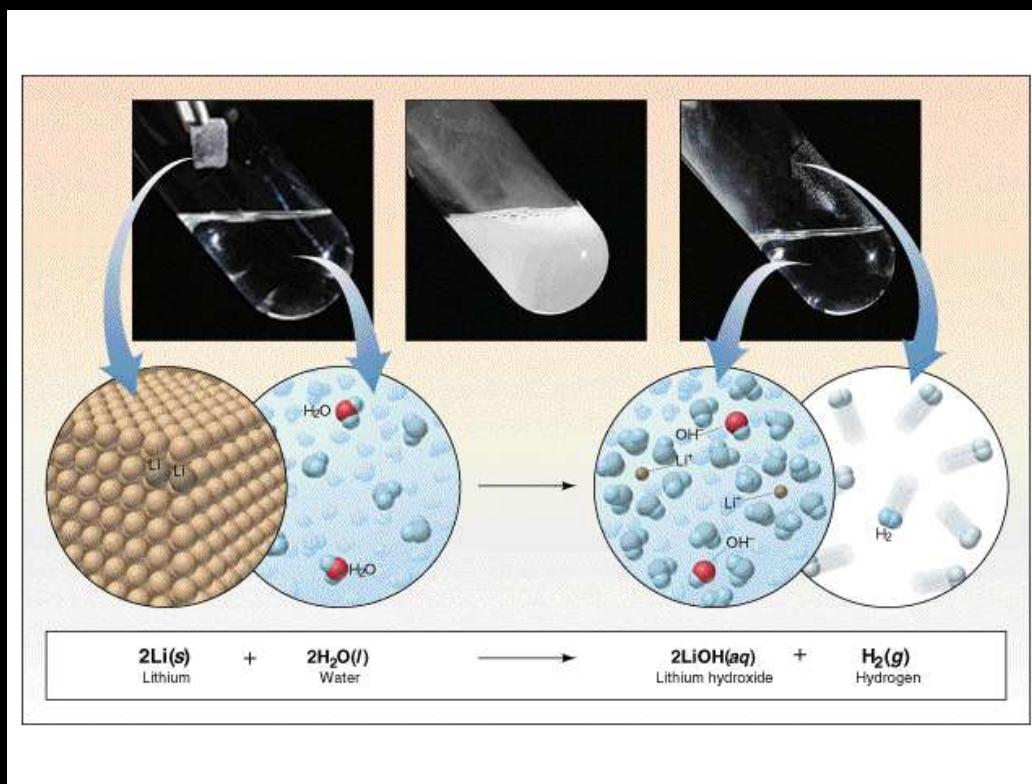
Zinc metal reacts with aqueous  
hydrochloric acid



Note: Zinc replaces the hydrogen ion in the reaction

# *Single Displacement Rxns*

**Another view:**



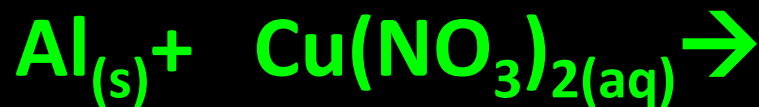
# *Single Displacement Rxns*

Sodium chloride solid reacts with fluorine gas



*Note that fluorine replaces chlorine in the compound*

Aluminum metal reacts with aqueous copper (II) nitrate...



# *Homework Question*

Page 228-231 in text, #13-22

*Bell Work*  
*4-Dec-2015*

**Calcium reacts with Sodium Phosphate**

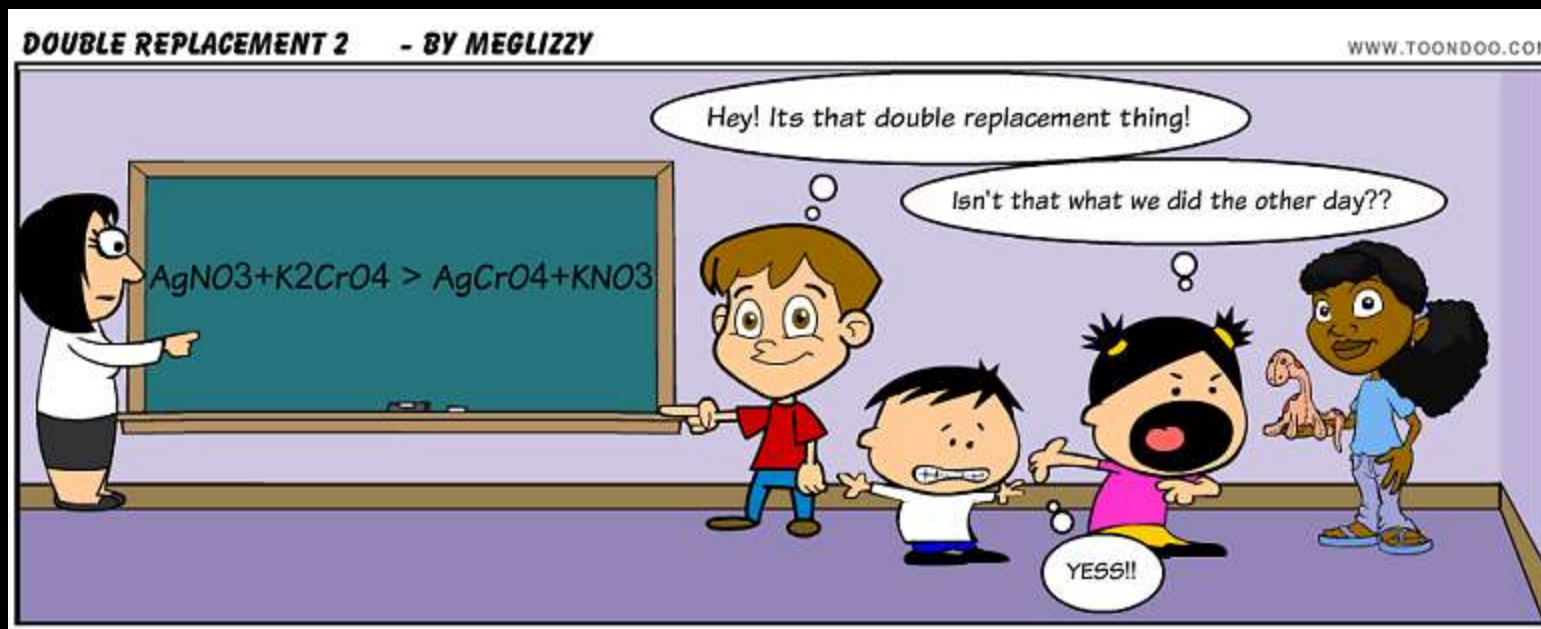
- A. Write the formulas of the reactants
- B. What type of rxn is this? (hint  $A + BC \rightarrow AC + B$ )
- C. Predict the products and write their formulas.
- D. Balance the equation



**Objective:** You will be able to identify the last two (2) more of the five (5) different types of chemical rxns and predict products based on this knowledge.

# 4. Double Displacement Rxns

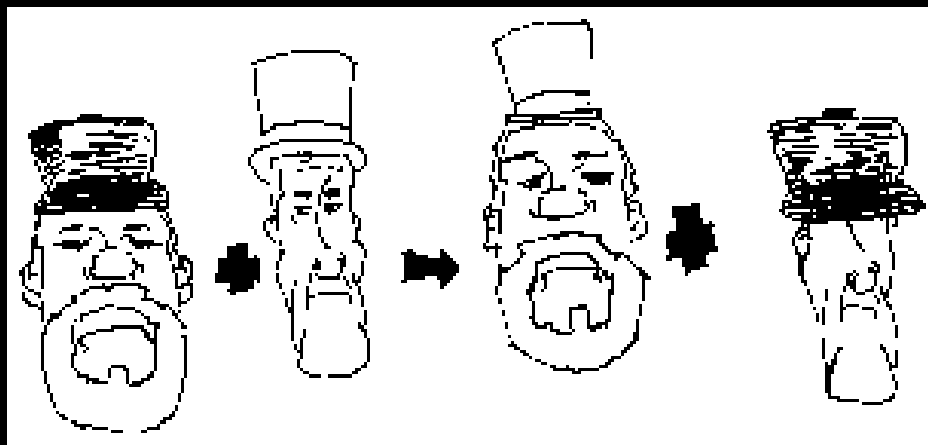
Compound + compound  $\rightarrow$  product + product



## 4. *Double Displacement Rxns*

**Double Replacement Rxns** occur when a metal replaces a metal in a compound and a nonmetal replaces a nonmetal in a compound

**Compound + compound  $\rightarrow$  product + product**



# *Double Displacement Rxns*

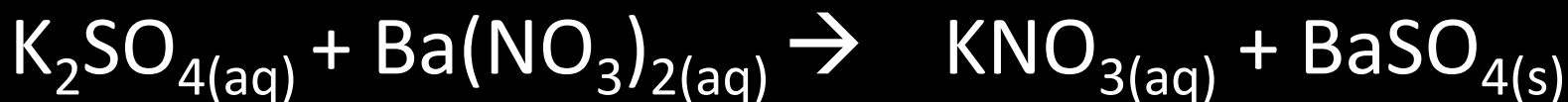
<http://youtu.be/57gfvzePCtA>

Think about it like “foil”ing in algebra, first and last ions go together + inside ions go together

Example:



Another example:



# 5. Combustion Rxns

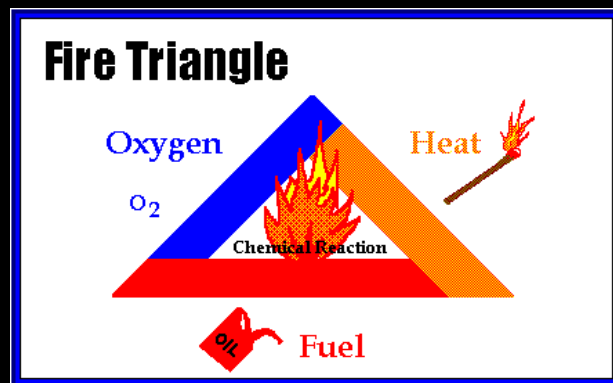
Combustion reactions occur when a hydrocarbon reacts with oxygen gas.

This is also called burning!!! You need three (3) things

**A Fuel (hydrocarbon)**

**Oxygen ( $O_2$ ) to burn it with**

**Something to ignite the rxn (spark)**

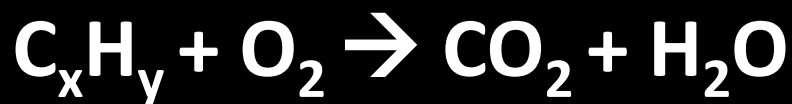




# Combustion Rxns



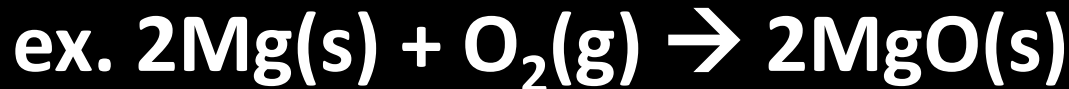
In general:



Products in combustion are **CO<sub>2</sub>** and **H<sub>2</sub>O**.

(although incomplete burning does cause some by-products like CO)

Exception: when combusting a non hydrocarbon



# Combustion

## Example



Write the products and balance the following combustion reaction:

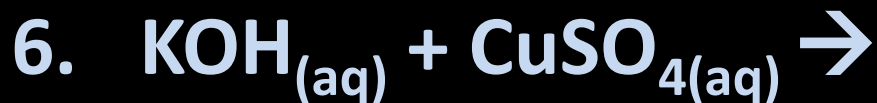
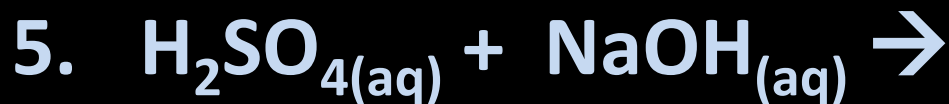
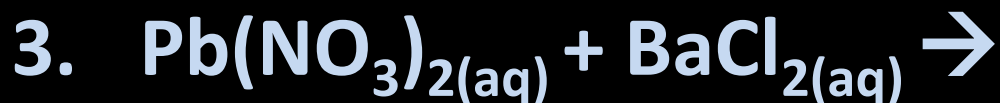
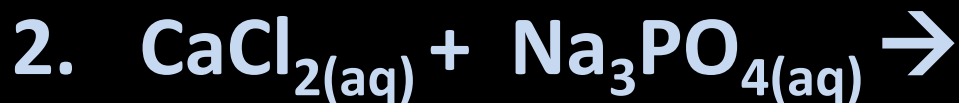


<https://youtu.be/tE4668aarck>



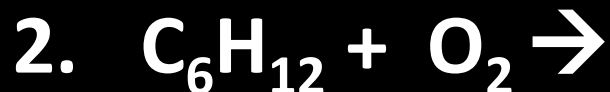
# *Practice*

**Predict the products. Balance the equation**



# *Mixed Practice*

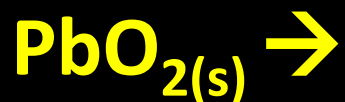
State the type, predict the products, and balance the following rxns:



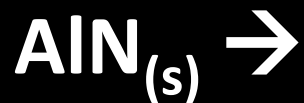
# *Practice*

Predict the products. Then, write and balance the following decomposition reaction equations:

**Solid Lead (IV) oxide decomposes**



**Aluminum nitride decomposes**

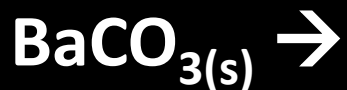


## *Practice*

Identify the type of rxn for each of the following synthesis or decomposition rxns, and write the balanced equation:



Nitrogen monoxide



(Use Cobalt (III))

